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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/749,958

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Valery M. Dubin

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7590

04/16/2008

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EXAMINER

LEADER, WILLIAM T

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

04/16/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/749,958	<b>Applicant(s)</b> DUBIN ET AL.	
	<b>Examiner</b> WILLIAM T. LEADER	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 36-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 36-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Receipt of the papers filed on January 14, 2008, is acknowledged. Claims 1-7 and 36-40 are pending.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. In view of applicant's amendments to the claims, the rejections of record are withdrawn and the following new rejections made.

#### ***Claim Rejections - 35 USC § 112***

4. Claim 2 recites the limitation "the electrochemical process" in line 1. There is insufficient antecedent basis for this limitation in the claim.

#### ***Claim Rejections - 35 USC § 103***

5. Claims 1-5 and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al (US 2005/0042369) in view of Parker et al (US 3,859,130) and Hoppe et al (6,737,939).
6. The Mao et al patent is directed to making a particulate catalyst for catalyzing the growth of carbon nanotubes. The process includes the step of

depositing a catalyst film onto nanoparticles in an electroless plating bath. See paragraph [0019]. Mao teaches that Ni, Co and Fe may serve as catalytic metals. See paragraph [0005]. The catalytic particles are deposited onto a substrate surface by a number of methods including painting, spraying and immersing. See paragraph [0035]. Mao refers to substrate broadly without specifying particular materials. Claim 1 differs from the process of Mao by reciting that the particle is formed rather than coated in an electroless bath, and by reciting that the substrate is a semiconductor substrate.

7. The Parker et al patent is directed to the formation of magnetic alloy particles in an electroless plating bath. Parker notes that electroless reduction procedures have most often been carried out to produce continuous films or coatings (column 1, lines 30-33). The invention provides an effective technique for producing finely divided particles by chemical reduction (column 2, lines 2-8). The particles may be alloys of cobalt with nickel or cobalt with iron (column 2, lines 22-27). The electroless bath contains dissolved metal salts of cobalt or mixtures of cobalt and nickel or iron. The metal salts, which provide metal ions that are precursors of the metal particles to be formed, are reduced with sodium hypophosphite or other source of hypophosphite, and dimethylamine borane. The particles have a spherical structure in a narrow range of particle sizes varying between about 0.01 to 3.0 microns (column 2, lines 28-39).

8. The Hoppe et al patent is directed to the production of carbon nanotubes.

The substrate on which the nanotubes are grown may be any material which can withstand the temperatures required for growth of the nanotube array. Materials include metallized Si oxide wafers, other semiconductor substrates, anodized alumina, glass or sapphire. See column 9, lines 30-38.

9. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have to have formed the catalyst particles in the process of Mao et al using the process of Parker et al because the particles would have been formed directly in the electroless bath and would have been formed in a narrow range of particle sizes. It would have additionally been obvious to have utilized a semiconductor as the substrate on which the catalyst particles were deposited because semiconductors are recognized as a suitable base which can withstand the temperatures required by carbon nanotube growth as taught by Hoppe et al.

10. With respect to claims 2 and 3, as noted above Parker teaches that the particles are formed in the electroless bath by reduction of ionic precursors of the metal particles. With respect to claims 4 and 5, Mao and Parker disclose the deposition of Group VIII metal alloys.

11. With respect to claims 36 and 37, Mao discloses applying catalytic particles onto the substrate from a solution of the particles by painting, spraying and

immersing (dunking). See paragraph [0034]. It would have been obvious to have deposited metal particles in the process of Mao directly from the bath of Parker by immersion or dispensing the bath by painting or spraying since this bath is a solution of particles as taught by Mao, and Mao teaches deposition of particles from such solutions. With respect to claim 38, Mao discloses extracting the particles from the bath in which they were made catalytic, and subsequently depositing onto the substrate. See paragraph [0028].

12. Claims 6, 7, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al (US 2005/0042369) in view of Parker et al (US 3,859,130) and Hoppe et al (6,737,939) as applied to claims 1-5 and 36-38 above, and further in view of Grill et al (US 2005/0089467) and Goldberg et al (US 6,838,354).

13. Claim 6 differs from the Mao et al by reciting a Group VI metal alloy while claim 7 differs by reciting an alloy of a Group VIII and a Group VI metal. Claim 39 recites a reducing agent in the bath. The Grill et al patent is directed to the growth of carbon nanotubes and discloses that catalytic particles are transition metals including Co, Ni and W and alloys thereof. See paragraph [0004]. The Goldberg et al patent discloses that alloys such as CoWP and NiWP can be deposited by electroless deposition from an electrolyte containing ions of Co, Ni, and WO. See column 4, lines 23-27 and column 5, lines 38-40. It would have been obvious at the

time the invention was made to have formed catalytic particles suitable for use in the process of Mao et al of an alloy including Ni or Co (Group VIII metals) and W (a group VI) metal because Grill et al shows that such alloys are effective catalysts for the growth of carbon nanotubes, and to have formed these alloys by the electroless process of Parker et al because Goldberg et al shows that electroless deposition is capable of forming alloys with these metals. Thus, the expectation of success would have been high.

14. Claim 40 differs by reciting that one or more reducing agents are alkaline metal-free reducing agents. As noted above, Parker teaches the use of sodium hypophosphite or any soluble hypophosphite salt (column 2, lines 48-53). Goldberg teaches that the reducing agent may be sodium hypophosphite or ammonium hypophosphite. See column 5, lines 40-43. It would have been obvious at the time invention was made to have utilized ammonium hypophosphite in the electroless process of Parker because Parker broadly teaches the use of a hypophosphite salt, and ammonium hypophosphite is shown to be an equivalent of sodium hypophosphite in electroless baths by Goldberg.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM T. LEADER whose telephone number is (571) 272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

William Leader  
April 9, 2008

/Susy N Tsang-Foster/  
Supervisory Patent Examiner, Art Unit 1795